The Medical Fortnightly.

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UNDER THE EDITORIAL DIRECTION OF

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A COSMOPOLITAN BIWEEKLY FOR THE GENERAL PRACTITIONER

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Editorial Department.

THERE is no longer any question about the infectious origin of tonsillitis. It is no uncommon experience, especially in schools and institutions to witness epidemics of this disease. Epidemics, too, which are disturbing because of their persistence. In institutions where the inmates occupy dormitories in common and where hygienic conditions are not good, it is frequently noted that the disease may linger for months, and the same individuals may have recurrent attacks.

Follicular Tonsillitis.

The bacteriology of the disease is interesting and opens an opportunity for thoughtful consideration of improved sanitary surroundings and more careful hygiene. Of the many germs found in the tonsillities the order of their frequency is about as follows: "The pneumococcus, the diphtheria bacillus, streptococcus pyogenes, diplococcus scarlatinæ, influenza bacillus, staphlococcus pyogenes and the tubercle bacilli" (J. M. Taylor).

In the epidemic of tonsillitis diphtheria may occur in epidemic form at the same time, also mixed infections of greater or less severity. By reason of the epidemics of tonsillitis and diphtheria differentiation in diagnosis is frequently very difficult and may require laboratory inquiry to settle the points in dispute. It is to be noted that the strumous and cachectic individuals are the most susceptible to the disease. The rheumatic diathesis is a very marked predisposing cause. Occupation is an etiological factor, also the use of the voice, as frequently noted among school-teachers, singers, ministers and others.

Follicular tonsillitis has a symptomatology which should be carefully noted. Many times diphtheria goes unrecognized because of the supposed existence of tonsillitis, and in consequence valuable time is lost in treatment, great harm is done to all concerned, simply because of the failure to be thorough in study of the signs of the disease. Again, conclusions are made from superficial examinations of the throat and diphtheria is diagnosed, when in fact follicular tonsillitis existed. It is well to note here that both diphtheria and tonsillitis may occur in the same individual at the same time. Munn, of Denver (*Philadelphia Medical Journal*), reported such a case. The writer saw such a case last year, in which diphtheria was the secondary infection.

In follicular tonsillitis it is well to note that the tonsils are not uniformly enlarged, their surfaces are dotted with the exudate filling the

crypts of the tonsils. This exudate represents the broken down cells, which accumulate in the crypts or laeunæ, blocks up the outlets, thus affording excellent localities for bacterial growth in the follicles and consequent accumulation of debris. The contents of these crypts has an odor which is foul and characteristic of infections of the mouth and upper air passages. The color of the exudate is yellow or bluish yellow, it thus differs from the false membrane of diphtheria, which is gray. The distribution of this exudate of tonsillitis over the tonsil may give rise to the belief that the disease is diphtheria and it is impossible to have a clinical diagnosis of diphtheria made with such striking symptom as a base. If careful differentiation is made by observing the character of the membrane, its color, the presence or absence of a raw surface, the pulse and temperature and, of great importance, the history of exposure, a provisional diagnosis can be made, pending confirmation of the laboratory investigation. The treatment of follicular tonsillitis is too frequently superficial or ignored. Tonsillitis is not a disease to be considered as of little consequence, for its relationship to affections of the endocardium is now well recognized. Also, various grave diseases follow in its train, such as albuminuria, pneumonia, pleurisy, tuberculosis, angina pectoris and several skin diseases. The ear affections, such as otitis, especially in children, and indirectly the more grave mastoid complications all may follow tonsillitis.

Some of the most brilliant workers in internal medicine have given patient study and research to this disease.

Now as to treatment. Rest, cleanliness and support of the patient, together with careful attention to the treatment of symptoms as they arise. The patient must be under observation ; it is not well to depend on reports of progress from unobserving individuals. The physician in assuming the responsibilities of such a case must have it understood that it is necessary to see the patient in order to give proper treatment. Calomel should be given at the very beginning of treatment, followed by salines. For the pain hot or cold applications over the tonsils. The throat must be cleansed with hot water gargles, to which may be added listerine or plain boric acid. In young children the swab or atomizer may be used. In more profound infections peroxid of hydrogen diluted, in atomizer or directly applied, will prove of excellent service. This should be repeated frequently. Internally the salicylates are indicated and should be pushed rapidly, as they relieve pain, especially in the rheumatic individuals. Salicylate of sodium or salophen are of especial value. For the relief of fever aconite is the reliable sheet-anchor, also belladonna should be given to relieve tension because of its antispasmodic action. Diet should be liquid or easily digested food and given in small quantities, during the height of the disease. Care during convalescence is enjoined. F. P. N.

MEDICAL SOCIETY OF THE MISSOURI VALLEY.— The semi-annual meeting will be held at Lincoln, Neb., March 20. Titles for contributions to the program should reach the secretary not later than February 1st. Chas. Wood Fassett, Secretary, St. Joseph, Mo.

A New Year's Endeavor.

EVERY physician who believes in himself, his profession and the great humanity, will find pleasure, consolation and inspiration in the following statement of "A Business Man's New Year Endeavor" which appeared in the *Congregationalist*, January 4, 1902. It is a statement which has attracted much favorable comment and one worthy of emulation by every physician:

"To be joyous in my work, moderate in my pleasures, chary in my confidences, faithful in my friendships; to be energetic but not excitable, enthusiastic but not fanatical; loyal to the truth as I see it, but ever open-minded to the newer light; to abhor gush as I would profanity, and hate cant as I would a lie; to be careful in my promises, punctual in my engagements, candid with myself and frank with others; to discourage shams and rejoice in all that is beautiful and true; to do my work and live my life so that neither shall require defence or apology; to honor no one simply because rich or famous, and despise no one because humble or poor; to be gentle and considerate toward the weak, respectful yet self-respecting toward the great, courteous to all, obsequious to none; seek wisdom from great books and inspiration from good men; to invigorate my mind with noble thoughts as I do my body with sunshine and fresh air; to prize all sweet human friendships, and seek to make at least one home happy; to have charity for the erring, sympathy for the sorrowing, cheer for the despondent; to leave the world a little better off because of me; and to leave it when I must, bravely and cheerfully, with faith in God and good will to all my fellowmen; this shall be my endeavor during the coming year."

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The Decreased Local Birth Rate.

THE local dailies have called the attention of the public to the fact that there were during the year just ended about 1700 fewer babies born in this city than were recorded for 1892, at which time the city's population was much less than it is at present. In seeking to explain this condition one or two writers failed to appreciate the gravity of such a record; facetiousness on such a subject is ill-timed in the extreme. It is easy to find the explanation if one will study the advertising pages of our dailies. We may not have evidence to make cases against the numerous abortionists who are following their unhallowed, though lucrative, business. But their presence among us is unquestioned, and it is a regretable fact that many of the number are physicians; the medical profession is all too ready to give the midwives credit for doing *all* this work. But a study of the birth rate will convince any one that relying solely on legitimate midwifery for an income, the large majority of the midwives would soon be eliminated by starvation, even if we conceded them all the obstetric work done in the city, where in reality they do but a small part of it.

Maternity is neither convenient nor fashionable, and is accomplished with not a little discomfort, but the man or woman who marries with the deliberate plan that it must be avoided, even though illegitimate means are

necessary to the accomplishment of the fact, is no better than the abortionist who does such work, and the law says that abortionists are criminals. Neither the law of God nor of man makes the criminality lie in accidental infection or in any of the various accidents which lead to being found out.

The time is ripe for a healthy reaction against interference with natural processes; we do not expect to see one, but we think one might be precipitated were it possible to give publicity to the names of the patrons when accident brings an abortionist in contact with the law; those who think the patrons are solely unfortunates who are seeking to avoid disgrace would be considerably surprised at the showing, if we are not greatly mistaken. T. A. H.

Death of Dr. J. T. Eskridge.

DR. J. T. ESKRIDGE, one of the most prominent of American neurologists, died January 16th at St. Luke's Hospital, Denver. Dr. Eskridge had been a patient sufferer from tuberculosis and complications for many years. He took up his residence in Denver in 1884, having removed from Philadelphia because of his failing health. In the West he found relief, temporary at least, from the ravages of the disease, and was able to carry on an extensive consultation practice and resume his literary work. Dr. Eskridge was an indefatigable worker—a man, indeed, who sought work as the panacea for all of his woes, and great was the amount of research, writing and careful notation which he was able to do in spite of his infirmities. He was a man of sterling characteristics, broad humanity and scholarly attainments, and the American profession will always do honor to his memory because of his achievements and the place he made for himself in neurology. At the St. Paul meeting of the American Medical Association Dr. Eskridge was made President of the Section of Neurology, and it is with sincere regret that this section will be called upon to meet without the benefits of his masterly and kindly qualities as a director of this section. We know that Dr. Eskridge had been planning a programme for the Saratoga meeting, because of correspondence we had with him prior to his illness, and it is to be hoped that his wishes and plans may be carried out.

American medical literature has lost one of its most scholarly contributors, clinical medicine an observer second to none in this country, and the special department of medicine, neurology, one of its greatest representatives.

If we were called upon to name the chief characteristic by which Dr. Eskridge will be known in medicine, we would say as a teacher, and in this we are sustained by his work in Philadelphia, at Jefferson Medical College, and his work in Denver in connection with the medical colleges there, but even above these his teachings in his original contributions to the literature of medicine. He was a teacher by natural qualifications, an observer by intuition, a writer by careful preparation and study. He was a man among his fellows, of quiet reserve, but full of the spirit of humanity, which recognized in every one some good, some ability worthy of development, and membership in broad Christian brotherhood of man. F. P. N.

CITY CULLINGS.

DR. AND MRS. FRANK L. HENDERSON are spending the winter in Europe. During Dr. Henderson's absence Dr. Saxl is occupying his office in the Century Building.

THE BULLETIN OF WASHINGTON UNIVERSITY, which was billed to appear in December, has not yet made its appearance. We are expecting it to be something of an eye-opener as a high grade journal when it does come.

THE ANTITOXIN-TETANUS CASES.—The court of inquiry which was to investigate the fatalities from tetanus following the administration of antitoxin early in the winter, has as yet made no definite report. The delay is variously interpreted by the public. The matter was taken up so vigorously at first that the present inertia is a little disappointing to those who think that a great wrong has been done, and that the blame therefor should be definitely fixed.

MEDICAL CO-EDUCATION.—The admission of women to the various courses offered at the Barnes Medical College has increased the popularity of that institution and has demonstrated that there was a need for a coeducational medical school in this city. It is a matter of considerable satisfaction to the advocates of co-education to note that the ladies in attendance are not only splendidly prepared for the study of medicine, but in their work they are showing that the men must work hard if they hope to carry off the honors at the end of the year.

WORLD'S FAIR MATTERS.—Since going to press for our last issue there has been considerable activity and progress in the World's Fair. The open weather is giving the best of opportunity for grading and excavating, and what has been accomplished would surprise those who have not recently visited the park, the work under way is well worth a trip to the scene of activity. The appointment of a Medical Director was the most important of recent developments at headquarters. During the early canvass for the Fair, and since, Dr. L. H. Laidley has practically engineered all medical matters, and his appointment to the directorship is in keeping with the expectations of the profession. Dr. Laidley possesses all the qualifications which assure dignity to the medical department of this great undertaking; we feel assured that this department will be efficiently managed, and will reflect honor on our profession and city. Some time since we expressed the opinion that the success of this department lay largely in the co-operation of the profession, it seems unnecessary to urge that every man of us give Dr. Laidley his active support and pledge him our loyalty, in so far as we can see these are already assuredly his.

Mercurol, says Short (*New Eng. Med. Mo.*), does not possess the property so undesirable in other soluble mercury salts, of coagulating albumin. It does not destroy cell vitality and is the ideal mercuric germicide. He has used it in old cases of gonorrhea and other purulent affections.

The Reviewer's Table.

Books, Reprints, and Instruments for this department, should be sent to the Editors, St. Louis.

DISEASES OF THE DIGESTIVE ORGANS IN INFANCY AND CHILDHOOD, with Chapters on the Diet and General Management of Children, and Massage in Pediatrics. By LOUIS STARR, M. D., Late Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania; Consulting Pediatrist to the Maternity Hospital, Philadelphia, etc. Third edition, rewritten and enlarged. Illustrated. Published by P. BLAKISTON'S SON & CO., 1012 Walnut St., Philadelphia. 1901. Price $3.00 net.

STARR has long been recognized as an authority on the nutritional disorders of infancy and childhood. This book is a comprehensive statement of his extreme clinical observations and practical deductions therefrom, and is a tribute to his scholarly attainments, both as an observer and author. It is one of those books from which the reader absorbs the enthusiasm of the author as well as receiving at first hand knowledge that is of service in everyday work. The subjects treated embrace more than what the title would thus imply, thus the introduction on general management of children is exceptionally thorough, likewise the chapters on "Diseases Produced by Improper Foods and Imperfect Nutrition;" then follows "Diseases of the Digestive Organs," then "Affections of the Throat, Stomach and Intestines." The chapter on "Tuberculosis of the Mesenteric Glands and Intestines" is a valuable one. The "Affections of the Liver and of the Peritoneum" are considered in a brief, but serviceable manner. Much of the material in this book is new, and consequently up-to-date in every respect. This book should be in the hands of every physician having to deal with children, and especially should the beginner in practice have at hand such an authority to help him solve the perplexing problems of nutritional disorders of infants and children. F. P. N.

TRANSACTIONS OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION. Complete account of Ninth Annual Meeting held at Washington, D. C., September 19, 20, and 21, 1899; also Tenth Annual Meeting held at New York City, September 25, 26, and 27, 1900. Illustrated. Pages 391. Price, Extra cloth, $2.00 net, delivered. Philadelphia: F. A. DAVIS COMPANY, Publishers, 1914-16 Cherry Street.

THE association which issues a volume of transactions such as this volume is doing excellent work for scientific medicine. Electro-therapy is not well understood by the physician in general because of the paucity of literature in our medical journals. This volume, comprising the transactions for two years, 1899 and 1900, is very useful in presenting information along the lines of practical therapy and by experts of authority. To those physicians who seek information in this field of practice this volume is invaluable as representing the very latest and best methods of practice. Among the numerous authors are the following: Robert Reyburn, A. D. Rockwell, Robert Newman, Apostoli, G. Belton Massey, W. J. Herdman, W. J. Morton, D. R. Brower, W. B. Snow, E. R. Corson and others. The subjects discussed are: The X-Ray in Various Applications; Papers on Electricity in Application to Treatment of Respiratory and Cardiac Failure; In Sciatica; Tuberculous Glands of the

Neck; Dilatation of Stomach; Nose, Throat and Ear; Cancer by Massey Method; Nervous Diseases of Women; Neurasthenia; Insanity; Urethra Strictures, etc. Then papers on technique, appliances, combined currents, etc. In all the volume is very serviceable, and is a valuable addition to the literature of today. F. P. N.

A BRIEF MANUAL OF PRESCRIPTION-WRITING in Latin or English for the use of Physicians, Pharmacists, and Medical and Pharmacal Students. By M. L. NEFF, A. M., M. D., Cedar Rapids, Ia. Pages 152. Size 8x5¾ inches. Extra Cloth, 75 cents net, delivered. Philadelphia, Pa.: F. A. DAVIS CO., Publishers, 1914-16 Cherry Street.

THIS attractive manual thoroughly explains all that concerns intelligent prescription-writing. We have never seen the subject more clearly or more ably handled. The growing popularity of the metric system in prescription-writing compels all members of the profession to familiarize themselves with its workings; nowhere can a more brief yet comprehensive exposition be found than here. The book should reach students in college—it will prove a great help to them—and post-graduate students who are writing prescriptions in a slip-shod fashion will spend time to a good advantage in studying its pages.

A REFERENCE HANDBOOK OF THE MEDICAL SCIENCES. Embracing the entire Range of Scientific and Practical Medicine and Allied Science. By Various Writers. A new edition, completely revised and rewritten. Edited by ALBERT H. BUCK, M. D., New York City. Vol. III. Illustrated by chromolithographs and 676 halftone and wood engravings. New York. WILLIAM WOOD & CO. 1901.

THIS volume is in keeping with the superior excellence of volumes one and two. We have mentioned in previous reviews the thorough revision to be noticed throughout this work. Many new subjects are discussed and old ones revised up to date. The illustrations are numerous, apt and helpful in elucidating the text. Volume III commences with chloralamid and extends to Equinox Spring, discussing in alphabetical order all subjects that directly or indirectly pertain to the medical sciences. Of special mention in this volume are the monographs Chloroform, by Bennett, as an anesthetic, which is a most complete discussion of this subject; on the Chorion, by Warthin; on Diseases of the Choroid, by Weeks; a very elaborate discussion of the Circulation of the Blood by Dreyer; a full one on Diseases of the Cornea by Buller; on Dietetics by Stahl; on Diphtheria by Park; a specially practical discussion of Dislocations by Duncan Eve; on Dissection and Operation Wounds by L. W. Bacon, Jr. Diseases of the Ear are fully discussed in a series of valuable monographs, covering 107 pages of the text, by such authorities as Burnett, Roosa, Sprague, Alderton, Daly, Lewis, Randall, Stephens, McKernon, Sheppard, Green, Birke, Clemens, Stout, Swain. These papers are designed especially to be of service to the general practitioner, and cover in their consider all of the essentials for the practical care care and treatment of diseases of the ear. Other subjects, notably Electricity, Embryology, etc., are well presented. Throughout the book the text is concise, clear and is carefully edited. The printers have done their

work well. All in all this is one of the great works commenced in the year 1901, and we will look forward for the succeeding volumes which are to appear from time to time. Every physician needs a reference work, and this one is the most complete published in any language. F.P.N.

JONATHAN HUTCHISON, F.R.S., General Secretary of the New Sydenham Society, has requested Messrs. P. Blakiston's Son & Co., of Philadelphia, the American agents of the society, to announce the publication of "An Atlas of Clinical Medicine, Surgery and Pathology," selected and arranged with the design to afford, in as complete a manner as possible, aids to diagnosis in all departments of practice. It is proposed to complete the work in five years, in fasciculi form, eight to ten plates issued every three months in connection with the regular publications of the society. The New Sydenham Society was established in 1858, with the object of publishing essays, monographs and translations of works which could not be otherwise issued. The list of publications number upwards of 170 volumes of the greatest scientific value. An effort is now being made to increase the membership, in order to extend its work.

OUR MONTHLY QUIZ.

Prizes Open to Fortnightly Subscribers.

TOPIC FOR FEBRUARY.

1. How do you treat the pernicious vomiting of pregnancy (medical and hygienic treatment)?

TOPIC FOR MARCH.

2. How do you treat the rheumatic affections, viz.: Rheumatic fever, sub-acute and chronic rheumatism?

Answers should reach this office not later than the 15th of the month.

Questions for discussion in this department are announced once a month.

For the best and most practical answer to any one of these questions we will give a prize of $5.00. To the second best a subscription to the FORTNIGHTLY for the year. The answers must be short, no one answer to contain more than four hundred words. We shall publish the substance of such of the answers as seem most likely to prove interesting to our readers.

Only subscribers to the FORTNIGHTLY will be recognized as competing (although we shall be pleased to hear from others who have ideas to suggest), and all persons known to be engaged in medical journalism are disqualified. Prizes will not be awarded to the same person more than once each year. Every answer must be accompanied by the writer's full name and address.

Original Department.

PAPERS for the Original Department should be in hand one month in advance, and contributed to THE MEDICAL FORTNIGHTLY exclusively. A liberal number of extra copies will be furnished authors, and reprints may be obtained at reasonable rates, if request accompanies the manuscript. Engravings from photographs furnished free.

Contributions, and books for review, should be sent to the Editors, 312 Century Building, St. Louis.

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Locomotor Ataxia; with Observations in Nine Cases.

BY EVERETT J. BROWN, M. D.,

DECATUR, ILLS.

Read before the Central District Medical Society, Pana, Ill., October 30, 1901.

AN expert neurologist once remarked to me that the general practitioner knew as little of neurology as he did of skin diseases; he said that few cases of spinal cord and brain lesions in their early stages were properly diagnosed by the general physician. That there is considerable truth in his statement cannot be questioned, and quite a number of successful general practitioners have confessed to me that they always dreaded to meet a case of disease of the nervous system, and that they rarely attempted to diagnose them.

Many cases of locomotor ataxia exist for years without being recognized, and I have known one case, which from a recital of the symptoms I am sure was tabes, pass on to a fatal termination with the general diagnosis of "paralysis." When a boy I heard my father, who was a physician, relate a case of multiple fractures of the long bones in an old man which gave all the physicians a great amount of worry, but which I know now must have been a case of locomotor ataxia.

Locomotor ataxia, or tabes dorsalis, was formerly described pathologically as a posterior spinal sclerosis, and the disease is often called by that name, but since the acceptance of the neuron theory it has been regarded as a primary degeneration of particular sets of sensory neurons, especially those whose neuraxons form the posterior columns of the spinal cord (columns of Goll and Burdach) and the optic nerve; we know now that the sclerosis is only a secondary process in which the vacancy left by the degenerated neuraxons is replaced by connective tissue. In the neuron theory we comprehend no longer the existence of a nerve cell and a nerve fibre, but only a nerve cell with minute processes and prolongations, vary-

ing in length from less than the diameter of the cell itself to the full length of the spinal cord, or from the brain to the body periphery.

Locomotor ataxia is a slowly progressive disease lasting from a few years to half a lifetime; apparent arrest may occur for many months or several years, but usually each year shows a little more advance over the preceding; clinically the disease is usually divided into three periods: (1) The pre ataxic stage with the lancinating pains, rectal and vesical symptoms, impotence and neurasthenic manifestations. (2) Ataxic stage with muscular incoordination, modified knee jerks and rigid pupils. (3) Paralytic or terminal stage, in which patient is bedridden and helpless, often blind, but often without the pains of the earlier stages.

Very few patients with locomotor ataxia come to the physician to be treated for the ataxia; the incoordination in walking may not occur for many years after other symptoms develop, and as Patrick says, "The *symptom* locomotor ataxia is of minor importance in the recognition of the *disease* locomotor ataxia." This has been my experience, for in these cases which I report today only one patient consulted me for difficulty in walking; three came for rheumatism in legs; one for progressive blindness; one for phthisis and neuralgia of legs; one for lightning pains in legs; one for gastric crisis, which he called bilious attacks, and one for an indolent ulcer on sole of foot at site of an old corn.

The part played by syphilis in the causation of tabes is now universally recognized, as a history of syphilis may be obtained in a large majority of cases (60 to 90 per cent), it is never an early but always a late manifestation of the infection, usually five to fifteen, or even twenty-five years after the initial lesion. But recognizing syphilis as a causative agent does not help much in the treatment, as the iodides and mercury have little effect; this is because tabes dorsalis is not syphilis of the spinal cord, but is a degeneration following luetic infection; the lesion is spoken of as a parasyphilitic one, and occurs in persons who have been vigorously treated for a long time, as well as in those who have not been treated at all. Strumpell says that tabes stands in the same relation to syphilis as diphtheritic paralysis does to diphtheria.

The two most important symptoms of tabes are the lost knee jerk and the rigid pupils (the Argyll-Robertson pupil). Diller gives the five cardinal symptoms of the disease as:

1. Failure of knee jerk.
2. Romberg symptom, or swaying of the body with eyes closed.
3. Argyll-Robertson pupil.
4. Lightning pains.
5. Loss of functions of bladder and sexual organs.

The symptoms may be best considered under those affecting the sensory sphere and those affecting the sympathetic nervous system.

(1) Motor symptoms: (*a*) *Ataxia.* This symptom which has given the disease its name is now considered of minor importance in the early recognition of tabes, for the disease may last for years—even a quarter of a century—without showing any incoordination of movements. When

ataxia occurs it affects usually the lower extremities, often one leg more than the other, and it is most apparent in walking; only rarely are the arms affected.

(*b*) *Romberg Symptom.* A swaying of the body when the patient stands with apposed feet and closed eyes. This symptom has been given undue importance, as even healthy people cannot avoid swaying to a certain extent in assuming this position, and at times a tabes patient will show a very quiet and firm station.

(*c*) Ataxia of the ocular muscles or a transitory paralysis of the third, fourth or sixth nerves; the intermittent character of this paralysis is an especial feature of tabes.

(*d*) *Hypotonia.* Deficient tonus of the muscles of the body, as shown by a weakness of the knees; the muscles become flaccid and the body very supple, so that the patient can perform some of the movements of professional contortionists.

(*e*) Lost knee jerk (Westphal's phenomenon); the most important single symptom of tabes, but of course not alone pathognomonic; in early stages there may be only a diminution or a dissimilarity of the knee jerks; in those rare cases of cervical or high tabes, in which only the cervical cord and roots are affected the knee jerks may be normal; in early cases when the tendon reflex is much diminished, or even lost, it may be elicited by striking the tendon at the same moment in which the patient performs some muscular action, such as closing the eyelids tightly or grasping the two hands firmly together; this is Jendrassik's phenomenon of reinforced reflexes.

(*f*) Argyll-Robertson phenomenon; a loss of the pupillary light reflex; the pupil is unusually small, often pin-head size (spinal myosis) and does not open in the dark; the pupils continue to respond, however, to accommodation. Mœbius says that an Argyll-Robertson pupil by itself suffices for the diagnosis of tabes, as only in very rare lesions (especially tumors), is reflex iridoplegia present. This symptom occurs in 75 per cent of cases; it may be the only symptom for years.

(*g*) Genito-urinary symptoms: the sphincters relax or contract abnormally.

(*h*) Rare motor disturbances are choreic, athetoid or tremulous movements or disturbance of articulation.

(2) Sensory Symptoms. (*a*) Lancinating pains; sudden intermittent pains occurring in any part of the body, but especially in the legs of a neuralgic or rheumatic character, but often shooting, cutting or lightning-like and producing the most terrible agony; it is for this symptom that many cases first seek medical advice.

(*b*) Anesthesia, hyperesthesia, paresthesia and analgesia. The hyperesthesia is rare occurring sometimes in the legs in the early cases; the analgesia and anesthesia occurs more or less regularly in three zones; the lower extremities, the brachio-mammary zone, the genito-urinary zone, and rarely a fourth—the cephalic zone. The zone of skin anesthesia around the body at the mammillary level is said by Patrick, who made a

special study of this symptom, to exist in 80 per cent of all tabetics, although usually not early in the disease. I found it present in three or four cases in which I sought for it. Below is a figure showing a typical brachiomammary zone (Figs. 1a and 2b) and the irregular zone as I found it in case II (Fig. II). The classical "girdle sensation" is rarely found; a band of numbness around the body may be complained of and severe darting pains in chest at various parts. The analgesia and anesthesia often affects the ulnar border of the arm and forearm and the little and ring fingers; the ulnar nerve is painless to pressure, so that the patient may not possess the traditional "crazy-bone," by which is meant the acute pain normally produced when pressure is made over the ulnar nerve at its exposed position behind the inner condyle of the humerus. Another peculiar sensory

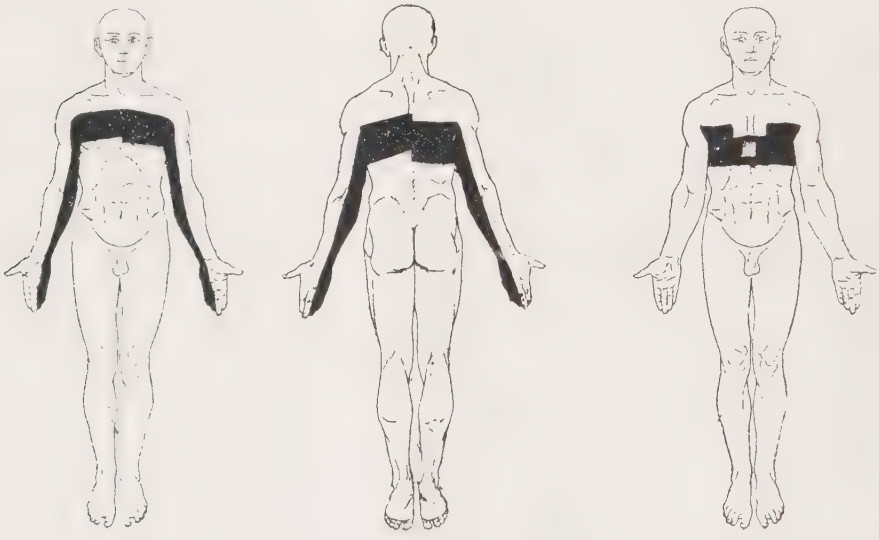

Fig. 1a. Fig. 2b Fig. II

AREAS OF ANESTHESIA (PATRICK). AREA OF ANESTHESIA IN CASE II

phenomenon often observed is the delayed conduction of sensory impressions to the brain and the persistence of painful impressions.

The analgesia of the lower extremities so often noted was quite marked in the case of perforating ulcer of the foot, which I report below. On account of extensive infection of the foot at the site of the ulcer it was necessary to incise and to insert several drainage tubes; this was done without pain to the patient. In many male tabetics there also exists analgesia of the testicles, so that even firm pressure causes no pain.

(*c*) Loss or diminution of muscular sense or of deep sensibility. This is the cause of the Romberg phenomenon—failure to realize the station—except with the aid of the sight; patient cannot walk in the dark without falling. One of my patients never ventures out at night without a lantern. All tabetics keep their eyes constantly on the ground as they walk.

(*d*) Impaired function of bladder and rectum due to anesthesia of the mucous membranes of these organs; incontinence of urine and of feces when bowels are loose; the urine may be slow in starting, or an inability to completely empty the bladder exists.

(*e*) Impotency.

(*f*) Amaurosis. The failure of vision is quite often the first symptom for which the patient seeks advice, hence he falls into the hands of the oculist early. The blindness is due to optic atrophy, and when it becomes complete the other symptoms become less (tabes arrested by blindness).

(3) Sympathetic Nerve Symptoms. (*a*) The crises; gastric laryngeal, vesical or intestinal; they occur as sudden agonizing pain in affected region, without apparent cause and of variable duration. The gastric crises are most common, and occur in five per cent of all cases; often one of the first symptoms of the disease, and is generally mistaken for a bilious attack or gastralgia; there is a sudden attack of vomiting with gastric pain of great severity. In case IV I first saw the patient in one of these attacks, which he called a "bilious attack;" the intensity of the pain, the absence of any dietetic cause and his clean tongue made me suspect a gastric crisis, and a further examination showed the cardinal symptoms of tabes.

(*b*) Trophic disturbances, as shown by (1) arthropathies, commonly known as Charcot's joint; this is a swelling of one or more joints, usually quite painless and resembling an osteo-arthritis; it occurs in from 5 to 10 per cent of ataxic patients and may be the first symptoms to attract attention; a knee is most commonly affected; next in frequency the hip, foot and shoulder; the main characteristics are the painless enlargement and the laxity of the ligaments; operation is useless, as bony union does not occur. (2) Perforating ulcers of skin and deeper tissues, especially of the soles of the feet, but sometimes in the hands or in the mouth; these are extremely rebellious to treatment. Case VII of my series applied to me for treatment for one of these perforating ulcers on the sole of foot at site of a corn; several physicians had vainly attempted to heal this, and one had operated under anesthesia but without benefit, all failing to recognize the tabetic origin.

(3) "Spontaneous fracture" of the long bones, usually some trivial cause is assigned, such as pulling on boots or turning in bed; the fracture is almost always painless, and with proper treatment good union results; multiple fractures sometimes occur.

(4) Excessive gland secretion, such as sialorrhea, gastrorrhea; diarrhea, etc.

(5) Erythema, edema and ecchymoses.

(6) Local atrophy, such as facial hemiatrophy or lingual hemiatrophy.

Diagnosis.—As it is the work of only a moment to test the knee jerks and the pupils, all patients coming to us with subacute or chronic symptoms, or those with suspicious acute symptoms should be so tested. Incipient tabes may show itself only by lightning pains in the legs, by periodical gastralgic attacks, by a sluggish ulcer on the sole of the foot, by difficulty in emptying the bladder, by loss of sexual power, by a transient

double vision, a drooping of one eyelid, or an optic atrophy ; many patients come complaining of rheumatism, sciatica or chronic neuralgia, for which they have been treated for years without the real disease being discovered. Other cases with rectal symptoms have been treated for proctitis, and with genito-urinary symptoms for cystitis, urethral stricture or prostatic disease.

To show the great variety in the modes of onset and the peculiar combinations of symptoms sometimes formed I will briefly relate the main points in the nine cases which form the basis of this report ; seven were men and two were women ; the youngest was aged 28, and the oldest 59 years. Five gave a distinct syphilitic history, in two more the history of such infection was highly probable, while two gave no such history.

CASE I.—Railroad conductor ; lightning pains, ataxia, impotence, absent pupil reflex, lost knee jerk, progressive paralysis, and death after six years suffering. The lightning pains of this man were something terrible ; he would suddenly jump up in bed and grasp the calf of his leg and scream in agony ; enormous doses of morphine gave only partial relief.

CASE II.—A woman aged 48, who came to me two years ago for rheumatism, for which she had been treated for five years ; there is ataxia, general health is good, but the pupils fail to respond to light, but do respond to accommodation ; slight ptosis in O. D. There is not static ataxia ; knee jerks are absent, but she has full control of anal and rectal sphincters; she has scattered areas of darting pains and numbness in hands and legs, and she has a distinct band of anesthesia about eight inches wide extending around the body at level of breasts ; over the center of the sternum is a normal area (see Fig. 2). The pains in her legs at times are very great and she has used much morphine of her own prescribing ; no syphilitic history is obtainable, but it is suspected, as her husband has been much treated for nocturnal headaches.

CASE III is another woman, aged only 28, who came to me to be treated for pulmonary tuberculosis. The great pains in her legs made me suspect a multiple neuritis, but on examination I found a non-responsive pupil, absent knee tendon reflexes, bladder symptoms and a zone of anesthesia around chest. She recently died in New Mexico of phthisis.

CASE IV.—Male, aged 52. Railroad employe ; had chancre but no secondary symptoms twenty-five years ago ; was called to treat him for a bilious attack, but the great severity of the pain and a finely contracted pupil made me suspect a gastric crisis and tabes. He has now been under my observation for five years, continues to work ; has slight ataxia, as is shown by the fact that he keeps his eyes constantly upon the ground in front of him when walking, and he cannot walk in the dark without falling. He has both bladder and rectal symptoms and at times rectal incontinence with anesthesia of rectal region and rectal sphincters. In the five years he has been under my observation I have never seen his pupils larger than a pin head, and I am sure he has taken no opiate ; the pupils are perfectly immobile regardless of the light.

CASE V.—Young man, aged 39; has had tabes for twelve years; main symptom has been excruciating lightning pains of both legs, occurring in paroxysms and requiring massive doses of morphine. The other cardinal symptoms exist, and he is recently passing into the ataxic stage with marked difficulty in walking.

CASE VI.—Freight conductor. I discovered his disease two years ago when examining him for life insurance; he complained of rheumatism, chest pains and difficulty in walking at night without his lantern. Romberg's and Argyll-Robertson symptom marked; also impotence, of which symptom he most complained.

CASE VII.—Male, aged 40; distinct luetic history; came to me for treatment of a sluggish deep ulcer on sole of foot near base of great toe; it was nearly painless and non-inflammatory. A glance at his pupils and a test of his knee jerks quickly determined the nature of the case. He has frequent gastric and intestinal crises, many attacks of lightning pains, but as yet no ataxia.

CASE VIII.—Male, aged 58. Wagon-maker; was markedly ataxic when I first saw him four years ago; walks with great difficulty, but in spite of all he continues to work at his trade; he has little or no pain, his vision is fair, but he has four of the five cardinal symptoms above mentioned.

CASE IX.—Male, aged 55. Syphilis eighteen years ago; came to me two years ago for beginning blindness and impotence; rigid pupils, optic atrophy; partial ptosis of one lid, slight ataxia, much head pain, lost patellar reflexes; he is still under observation. His amaurosis is increasing, while his other symptoms, such as incoordination, pains, bladder symptoms, etc., are at a standstill. He represents, although somewhat imperfectly, that class know as "tabes arrested by blindness."

SUMMARY.

1. Locomotor ataxia is one of the most common of the chronic nerve diseases.

2. It is often unrecognized for years, although the most easily recognized of all cerebro-spinal nerve lesions.

3. To avoid overlooking this disease, examine every patient with symptoms of whatever nature for the knee jerk and the pupil reaction; if both exist the patient has no tabes.

4. Examine further for evidence of tabes in any patient showing the following symptoms:

Difficulty in walking, especially in the dark.

Gradual failure of vision, or double vision, or a transient squint.

Lancinating pains, or neuralgic pains in legs, sciatica, chronic rheumatism.

Sudden attacks of gastric pain, or causeless vomiting, or "bilious attacks" frequently repeated.

Difficult or urgent urination ("bladder disease"), incontinence of urine or feces, numbness of anal region.

Diminution or failure of sexual power.

A sluggish ulcer on foot or leg.

A large painless swelling of a joint.

Spontaneous fracture of a long bone or a fracture from some trivial cause.

Numbness of one or both little fingers or of ulnar sides of forearms.

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Pruritus Ani.—The following gives great service in relieving troublesome itching :

℞ Alumnol ..... gr. xxx
Pulv. camphoræ ..... ʒiss
Lanolini, q. s. ad ..... ʒj
M. Sig.: Apply locally night and morning.—*Jour. A. M. A.*

Facial Neuralgia.—

℞ Tinct. aconite root .....
Chloroform .....
Alcohol .....aa ʒiv
Ol. peppermint ..... ʒj
M. Sig. Apply with a camel's hair brush.—*Med. News.*

Dysmenorrhea.—

℞ Spir. camph. comp ..... ʒij
Spir. camph ..... ʒi
Tinct. ginger ..... ʒss
Spir. lavender comp ..... ʒss
Aq. dest., q. s. ad ..... ʒij
M. Sig. Dessertspoonful every hour or two.—MATTICE, *Ex.*

Rheumatism.—

℞ Tinct. opii ..... fl. ʒj
Potassii carbonatis ..... ʒss
Glycerini ..... fl. ʒij
Aq. ..... fl. ʒix
M. Sig. To be applied to the inflamed joints on warm lint.—Wilson's "Textbook of Applied Therapeutics."

A Case of Phlegmonous Erysipelas of the Arm Requiring Amputation at the Shoulder Joint.

By W. V. Loftus, M. D.,
ST. LOUIS.

IN a general way it may be said that the best results in surgical cases are obtained when operations are performed in well-appointed hospitals with all modern accessories and every precaution taken to prevent infection. If the patient is then left in the care of a well trained nurse, who will inform him at once of any accidents that may arise in the after-course of the case, the surgeon may then feel satisfied in having done everything to insure the success of the operation. A considerable percentage of patients, however, who require operative intervention cannot avail themselves of these hospital advantages. In some instances even, they are unable to secure the services of a surgical specialist, and hence the attending physician must be prepared for any emergencies and be able to grapple with those that arise. The practitioner is not always ready or willing to assume the responsibility of surgical treatment, fearing that his uncultivated technique may give rise to unfavorable criticisms should the operation not prove a success. Still, when a human life depends upon it, it is plainly his duty to operate.

The writer was recently called upon to participate in an emergency of this kind, and as the case presented a number of points of unusual interest, both medical and surgical, the details have been fully reported below.

Mr. S., salesman, aged 68, was attacked in June, 1901, with a phlegmonous erysipelas of the right hand. The disease was quite typical, and pursued its usual course. The hand became very edematous, and continued to swell until it was enormously enlarged and of a brawny hardness. In about ten days the swelling extended to the shoulder, the skin being tense and having the characteristic red color. This appearance of the skin now assumed a more dusky tint, being mottled here and there with dark purple patches. The tension also became less marked, and a soft boggy feeling gave evidence to the fact that the subcutaneous tissue was disintegrating.

An incision was made in the hand which disclosed the presence of shreddy masses of gangrenous cellular tissue and a commencing necrosis of the bones. A little later it was noticed that a deep-seated abscess was developing on one side of the patient's legs. All of these symptoms clearly demonstrated that the infection was becoming more virulent, and in view of the critical condition of the patient the question of amputation of the arm demanded consideration.

If the patient had been young and previously of good constitution there would not have been any doubt as to the propriety of operating; but as is well known, phlegmonous erysipelas usually manifests itself in subjects of broken-down constitution who are suffering from the abuse of alcohol or from diseases of the liver or kidneys. In this instance the liver had been affected, and it was also probable that the patient had been addicted to al-

coholic excess. Owing to his advanced age it was also recognized that the process of repair would be greatly retarded even under the most skillful management. Overshadowing all these objections to operative treatment, however, was the phenomenal weather, the temperature every day exceeding 100°, and often reaching 106, 107, and even 109°, in the shade. Yet with all these contraindications it was felt that amputation would be a move in the right direction, and that without surgical interference death would quickly result. An amputation was therefore decided upon, even though it offered scarcely a forlorn hope. The patient's family physician was the chief operator, being aided by two assistants, one of whom was myself. After the parts had been thoroughly disinfected amputation was performed at the upper third of the humerus. It is worthy of mention here that some time previously the redness and swelling had receded almost to the elbow, but at the point of amputation the tissues were found to be unhealthy, and sloughing of the flaps would undoubtedly have ensued. A second amputation was consequently made at the surgical neck of the humerus, but even here the appearance of the muscular and cutaneous tissues was not encouraging.

All the muscles of the stump had been bathed in unhealthy secretions which permeated the spaces of the areolar tissue. Now that the air had been admitted decomposition would rapidly follow, unless some means was used that would keep the parts in an antiseptic condition, and at the same time promote a healthy reparative process, and for this purpose europhen was applied liberally to the stump, which was then carefully bandaged. It may be stated here that my previous and quite large experience with europhen has shown it to possess a remarkable antiseptic effect, and has a special influence in stimulating the formation of healthy granulating tissue. Owing to the lightness of the powder it need be used only in a very thin layer, and it has none of the objections of iodoform as regards odor or poisonous qualities. The abscess on the leg was next opened and emptied, and a strip of gauze well saturated with europhen inserted.

The patient came out well from under the influence of the anesthetic (chloroform), no nausea occurring. The subsequent course of the case was without particular interest. The tissues of the stump assumed a healthy appearance, and the healing process while slow was uninterrupted. At the end of about two months the patient was well enough to stroll about town.

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Methylene Blue given internally is advocated by O'Neil in the *Medical Record* as a cure for gonorrhea. It is especially fatal to the gonococcus, curing the disease in from four to seven days, destroying also the accompanying pyogenic bacteria. It is best given in one grain doses in capsules three or four times a day, reduced to two after the fourth day. If it causes irritation it may be combined with oil of nutmeg. Oil of sandalwood is a useful adjuvant on account of its diuretic and local sedative action.

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DISEASES OF THE LUNGS AND PLEURA.*

A Series of Papers written expressly for this magazine, by

BY ALBERT ABRAMS, A. M., M. D. (Heidelberg),

SAN FRANCISCO, CAL.

Consulting Physician for Diseases of the Chest, Mt. Zion Hospital and the French Hospital

[CONTINUED FROM PAGE 25.]

Symptoms of Bronchitis in the Small Tubes.—Here bronchitis is known as capillary bronchitis or suffocative catarrh. It usually follows an extension of bronchitis from the larger to the smaller tubes. It is specially frequent in infants, young children and in old persons. Fat subjects, specially women, are predisposed to the affection. Its onset is often sudden and begins with chills and high fever. In a child convulsions may initiate an attack. The temperature may rise to 104° F., or even higher.

It is well to remember that, if in children suffering from bronchitis, the temperature rises above 102° F., we must always suspect implication of the smaller tubes. In fact, it is my experience to note fluctuations in temperature during the course of a bronchial catarrh in children, due in all probability to implication of the smaller tubes; the temperature elevation not being permanent unless a large number of small tubes are involved. The patient gives the decided impression of being more gravely sick than in an ordinary case of bronchitis. *Dyspnea* is a characteristic symptom, the respirations attaining 60–80 a minute. Dyspnea may be paroxysmal and the patient must not infrequently be propped up in bed (*orthopnea*) to facilitate respiration. *Cyanosis* is a common symptom, and denotes cardiac as well as respiratory embarrassment. Cough is frequent, paroxysmal and painful; the expectoration is viscid and difficult to expel.

Physical Signs.—In addition to the signs which are present in bronchitis, we have fine subcrepitant and crepitant rales. They are best heard over bases of the lungs posteriorly. The percussion note is unchanged, hyperresonant, from coexistent emphysema, or dull or even flat from atelectatic collapsed areas or complicating pneumonia. The sputum contains no characteristic organisms. Capillary bronchitis, being essentially a catarrhal pneumonia, will be described more fully in discussing the latter disease.

Nature of the Bronchitis.—*Plastic bronchitis* is characterized by the expectoration of solid fibrinous casts of the smaller tubes unravelled under

* The first paper of this series, on "Cough," appeared in our issue of August 25th, 1900, and the following have appeared in their order: "Pulmonary Atelectasis," "Relation of Respiratory Diseases to the Circulatory Apparatus and the Nervous System," "X-Ray Examination in Diseases of the Chest," "General Therapeutics of Pulmonary Diseases."

water, the casts are tree-like in shape. This form of bronchitis affects males twice as frequently as females, and is encountered at all ages. In addition to the conventional signs of bronchitis, hemoptysis occurs in about one-third of the cases. The disease may be acute or chronic. In the former form of the affection, the majority of cases die. In 10 cases reported by Biermer death resulted from asphyxia in six of the cases. In the chronic form, which may last for years, the general health is only slightly, if at all impaired.

Physical Signs.—The upper portions of the lungs are oftener involved than the lower portions (Peacock).

Prior to the expectoration of casts, the disease is not capable of recognition. Their source may be determined by the presence of bronchial catarrh in a given area followed by pulmonary collapse in the same area.

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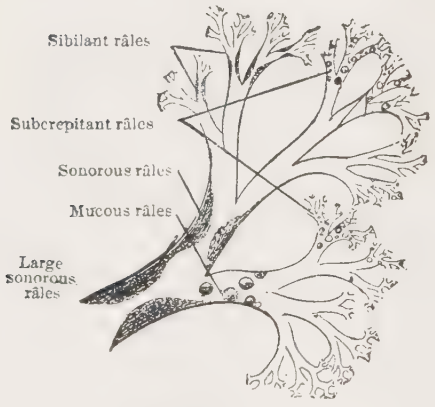

Diagram Illustrating the Physical Signs of Bronchitis (Loomis).

Cast in Plastic Bronchitis.

After the casts have been expelled, the dull percussion sound previously indicating their presence is supplanted by a normal percussion note.

Putrid or Fetid Bronchitis.—While this variety of the disease usually accompanies bronchiectasis, it may rarely attend bronchitis without dilatation of the bronchial tubes. The sputa of fetid bronchitis have a gangrenous or fecal odor, and on standing separate into three layers. The upper layer is usually fluid or frothy, the second is sero-albuminous, and the lowest layer contains pea-size masses (*plugs of Dittrich*), bacteria, fat crystals, leucin and tyrosin.

DRY CATARRH (CATARRH SEC OF LAENNEC).

This affection is said to affect at least one-half of the healthy adults in the driest parts of France and nearly all the inhabitants of cold sea coasts and humid valleys. The expectoration which is scant, consists of semi-transparent airless globules gray in color with a pitch consistency and about the size of a millet seed. Over the affected areas of the lungs the

respiratory murmur is faint or absent. Dyspnea, or even asthma lasting several days, may occur. Laennec attributes the affection to a chronic congestion of the bronchial mucosa. It is questionable whether such an affection as this really exists. At any rate, I have never observed it, nor is it described in the modern text-books. The affection in question may bear some relation to a disease which I will describe later on as *spasmodic bronchostenosis.*

Bronchorrhea.—Laennec describes this affection under the name of *chronic idiopathic pituitous catarrh.* Usually night and morning large amounts of sputa (two or three pounds) are expectorated. The disease is frequent among the aged and in gouty subjects. Probably the affection is nought else but bronchiectasis.

Bronchiolitis Exudativa.—This is a specific form of bronchitis described by Curschmann which is associated with typic asthmatic paroxysms. The beginning of the attack is unattended by expectoration, but later on, the expectoration which is usually sparse, shows under the microscope, asthma spirals and crystals.

Eosinophilic Bronchitis.—This affection described by Teichmuller is characterized by the presence in the sputum of a large number of eosinophile cells.

Pseudo-membranous Bronchitis caused by infection with aspergillus fumigatus has been described, the spores and mycelium of the aspergillus having been found microscopically in the sputa.

Etiologic Diagnosis.—There are some forms of bronchitis which are easily associated with some constitutional trouble, notably the phthisical habitus, gout, the acute infectious diseases, syphilis and Bright's disease. Bronchitis is the most common of all diseases, constituting three-tenths of all internal affections. While so-called "cold" and microbes have been held responsible for its etiology, we have disregarded the action of toxines which are eliminated by the lungs. When this avenue of excretion is clogged by insufficient activity of other emunctories, or when free respiration is impeded, the toxines unquestionably set up a chronic bronchitis. I can recall many instances of chronic recurring bronchitis which only yielded to treatment by lung development, free catharsis and active diaphoresis secured by systematic exercise. Bronchitis is contracted more often indoors than out of doors. It is not infrequent to find many cases of tuberculosis which never go beyond the stage of bronchial catarrh, and it is only from an examination of the sputum that the real nature of the affection is determined.

Gout.—Bronchitis is frequent in this affection associated with the classic articular signs, or when the latter are absent (latent or suppressed gout). It is in the latent form of gout that difficulty presents itself in diagnosis, and treatment directed toward the relief of lithemia is often the only positive clue in diagnosis. The subjects of suppressed gout have an annoying cough, usually paroxysmal in character, with little expectoration. The sputa are viscid and with difficulty expelled. Auscultation reveals sibilant rales. At night the breathing may assume an asthmatic character.

Among other symptoms may be noted: depression, pain in the hepatic region, indigestion, constipation, functional heart disturbance, and the excretion of dark colored, highly acid urine, which on standing, yields a deposit of pink lithates. A most trustworthy symptom in my experience in latent gout is a painful enlargement of the liver. This hepatic involvement may or may not be associated with symptoms of dyspepsia, in fact, we are likely to neglect an examination of the liver, owing to the absence of dyspeptic disturbances. Suppressed gout may manifest itself by no other symptom than this hepatic enlargement which eludes even percussion, although careful palpation invariably elicits tenderness which is most often referred to the epigastrium. The therapeutic test is diagnostic. Underfeeding and colchicum soon cause evanescence of the hepatic tenderness, together with the bronchitis or other obscure signs of suppressed gout. It is unfortunate that our profession should be made the target for the unprincipled manufacturing chemist, who foists on us preparations supposedly of value, but which in reality are without effect. By this means we are lead into error which would otherwise be impossible were we to employ more often our common-sense rather than the chicanery of the nostrum vender.

Acute Febrile Affections.—Bronchitis may initiate an attack of typhoid fever, and it may be of such severity as to completely mask the other signs of the disease. In nearly all the acute infectious diseases, bronchitis may exist as a complication and as a sequel of measles and pertussis, delaying recovery for a protracted period.

Syphilis and influenza are concerned in the etiology of a specific bronchial catarrh, which will be discussed in the chapters devoted to these affections.

Differential Diagnosis.— Putrid bronchitis may be confounded with bronchiectasis and gangrene of the lung, insomuch as the sputa in all these affections are feculent and divide in standing into three distinct layers. In lung gangrene, if the sputa are spread on a glass plate, shreddy fragments of lung tissue may be picked out. The presence of elastic fibres are said to be present in the sputum in the latter disease, but I have never been able to detect them. In lung gangrene we have the physical signs of consolidation, and if the destruction of the lung is extensive, there are the usual signs of cavitation. The constitutional symptoms in gangrene are pronounced associated with grave depression, rapid pulse, moderate fever and hemorrhage.

Bronchiectasis is more difficult of differentiation and often impossible, unless extensive sacculation is present. In bronchiectasis, cough and an abundant expectoration are paroxysmal. In bronchiectasis I have frequently encountered in the interscapular region a slight dulness which, if demarcated very carefully by the dermograph, will be found to correspond with the course of the primary bronchi. This dulness is caused no doubt by the dense cirrhotic lung tissue surrounding the sacculations.

In edema of the lungs, bronchial asthma and lung atelectasis, rales are heard which must not be confounded with the rales of bronchitis ; and we must also avoid the error of mistaking muscle sounds.

In lung edema the rales are most pronounced in the dependent lung areas. The rales are moist and uniform. Very frequently the diagnosis is clinched by the recognition of a cardiac or renal disease which has evoked the edema. The rales in edema are never squeaking or groaning unless complicated by asthma.

In bronchial asthma the rales are chiefly expiratory with accentuated and prolonged expiration. I have found that the inhalation of nitrite of amyl will temporarily dispel rales caused by asthma, whereas the rales of bronchitis will be uninfluenced. In the employment of this drug diagnostic measure, we must be careful to exclude the spasm of the smaller bronchial tubes provoked by bronchitis. This bronchial spasm is discussed elsewhere under the caption of spasmodic bronchostenosis.

In lung atelectasis rales are likewise heard, but they are faint and are heard only during inspiration. Successive deep inspirations will dispel them, specially if the patient is enjoined to sit up in bed.

Muscle sounds are produced by muscular contractions in the chest wall, which may frequently be confounded with rales. The untrained auscultator should make himself familiar with muscle sounds. By closing both ears with the fingers and making firm contraction with the masseters, the teeth being firmly clinched, one may hear muscle sounds. The sound varies from a low pitched roar, or rumbling to sounds not unlike those of a puffing engine. Cabot, who has given much careful consideration to a study of these sounds finds that they are best heard during forced inspiration, owing to contraction of the voluntary muscles during this phase of respiration. They are most often encountered over the pectoral muscles in front and the trapezius behind.

Prognosis.—As a rule, bronchitis is an affection with a good prognosis. In the aged, debilitated and in very young children, the prognosis should always be regarded as ominous, for we never know at what time pneumonic complications may develop by encroachment on the finer tubes. Repeated attacks of bronchitis as well as the chronic form of the affection may cause atrophy of the bronchial mucosa conducing to bronchial dilatation (bronchiectasis). Infiltration of the peribronchial tissues may give rise to an interstitial pneumonia. Emphysema may result from atrophy of the alveolar septa. The heart, especially the right chambers, bear an unusual burden and may hypertrophy, or what is more disastrous, they may dilate. Violent paroxysms of coughing may lead to rupture of air vesicles and the development of subcutaneous emphysema.

Morbid Anatomy.—The bronchial mucosa is intensely red. Dry at first, it soon becomes occupied by a mucous or muco-purulent exudate. The bronchial mucosa will be found under the microscope to be infiltrated with round cells; the epithelial cells are degenerated or converted into goblet cells, and the mucous glands are distended with mucus. Not infrequently the inflammation extends into the peribronchial tissue (peribronchitis) and the cartilaginous tissue may be implicated (perichondritis). In chronic bronchitis the mucosa is hypertrophied and occupied by polygonal or columnar epithelium in place of the ciliated variety of cells.

Ulceration is rarely present in simple bronchitis, but not infrequent in the syphilitic or tuberculous forms of the affection.

Treatment.—This is based on a careful study of the etiology and anatomic-pathologic data. In the idiopathic forms of this affection, we have no other recourse but to acknowledge our ignorance of etiology. In the symptomatic bronchial catarrhs, we must be persistent in our search for the cause, which when found, serves a precise index for prophylactic treatment. A bronchitis is dangerous in two chief directions: 1. By mechanic occlusion of the tubes. 2. From the tendency of the inflammation to involve neighboring structures and the reaction on the general organism.

Mechanic occlusion of the bronchial tubes is caused by swelling of the mucosa plus the augmented secretion. Confined to the larger tubes such occlusion is rarely of moment, but should the smaller tubes becomes implicated, oxygenation of the blood is impaired and the individual is practically in a condition of asphyxia. Add to this occlusion, the tendency to the development of broncho-pneumonia and the disuse of lung areas provoked by atelectasis, and the danger is measurably enhanced. The reflex act of coughing aids in the elimination of one factor, viz., the removal of the secretion which, if allowed to remain, furnishes a suitable medium for pathogenic micro-organisms which compromise the health of the organism and conduce to local disturbances.

Tendency to Involve Neighboring Structures.—The inflammation may spread to the bronchioles and alveoli, to the connective tissue of the lung and to the pleura. Another element of danger resides in the loss of the epithelial cells which permit the entrance of organisms into the lung structures and the general circulation. Tissue respiration throughout the body must necessarily be impaired, owing to the retarded inhalation of oxygen.

Treatment of Tracheitis and Acute Catarrh of the Larger Tubes.—Not infrequently an acute bronchitis may be jugulated by rest in bed and the artificial production of diaphoresis. Ten grains of Dover's powder or a grain of opium in any other form will assist diaphoresis aided by warm drinks, notably hot milk with seltzer or some mineral water. A more efficient measure before going to bed is to take a Turkish bath or, if this is not available, a prolonged warm bath as hot as can be borne, the patient being immersed for at least fifteen minutes, after which the patient is wrapped in blankets. Baelz maintains, that in Japan, very hot baths (106° F. and over) are a certain means of avoiding "catching cold." I attempted one of these baths in an interior village in Japan, and my experience constrained me to conclude that I preferred "catching cold" It is often impossible after the hot bath to induce diaphoresis, in which instances, recourse must be had to the wet pack or the hot air bath. The former is applied by wringing a blanket out of hot water, enveloping the patient in it and then covering it successively with a dry blanket and a rubber sheet. In this covering the patient remains an hour. The hot air bath is best given by allowing the hot air or vapor to pass by means of a rubber tube under the raised bed clothing.

When the foregoing means fail and the patient is of a robust constitution, no remedy is more efficient for inducing diaphoresis than the hypodermic use of pilocarpin (gr. $\frac{1}{6}$–$\frac{1}{8}$ to an adult, and $\frac{1}{20}$–$\frac{1}{12}$ of a grain to children from two to eight years).

I am a firm advocate of the hot linseed poultice applied to the chest, front and back, and changed frequently. At night, after discontinuance of the poultices, the cotton jacket should be applied. If the feelings of the patient are an index to the use of the poultices they would be used more often. The poultice acts by the derivative effect on the skin, the creation of a moist atmosphere in the immediate environment of the patient and by inducing the lung reflex.

Stimulant liniments applied to the chest in a warm room also possess an element of efficiency, and in pediatric practice, we can only conciliate the mother by such treatment. After the liniment is applied, the chest is covered with a layer of cotton wool, retained by means of a loosely applied bandage. If the patient manifests the slightest rise of temperature, rest in bed must be strictly enjoined. The diet during the febrile period should consist of liquid food only.

Our next effort is to control the cough. Here the opiates, especially codein, are always the most reliable. Unless the cough is distressing or spasmodic, recourse to such remedies should be interdicted, insomuch as they delay resolution by inhibiting the bronchial secretions. One of the most efficient expectorants which acts at the same time as an anodyne is apomorphin. To a child, the following formula may be administered:

℞ Apomorphin, hydrochlor..... gr. ss-gr. i
Acid. hydrochlor. dilute..... gtt. x
Syrupi..... ℥ss
Aq. menth. pip..... ℥iss
M. S. A half to one teaspoonful every two hours.

In urgent cases apomorphin is best given subcutaneously beginning with small doses which may be increased gradually. Very often we may combine a sedative with an expectorant, as in the use of pulv. ipecacuanhæ co.

The expectorants ought not, as a rule, be given until expectoration occurs, which indicates that the bronchial affection has passed from the stage of hyperemia to that of free secretion.

Tincture of belladonna, in drop doses for every year of the child's age has been lauded by competent authorities as a remedy for bronchitis in children.

Treatment of Acute Bronchitis of the Smaller Tubes.—In the treatment of capillary bronchitis, specially in the aged and in children, we are dealing with a disease of grave import, yet in no affection is the active interference of art so productive of good results. The danger it must be emphasized is not from the fever directly, but from the swollen bronchial mucosa, which deprives the individual of large respiratory areas, either directly or indirectly, by a much to be feared complication, viz., atelectasis. The symptomatic picture is clearly that of subacute asphyxia, with the rapid respirations, small and rapid pulse and cyanosis. Recognizing that the danger is essentially from the swollen mucous membrane, and from its al-

most invariable concomitant atelectasis, our essential object is to combat the atelectasis, knowing fully well that we have no specific remedy to combat the infectious bronchial process. We have already referred in the chapter on "General Treatment" to the fact, that the use of antithermic remedies are invariably attended by danger to the heart, which must at all hazards be maintained, yet if a remedy is at our command to reduce the temperature, which at the same time is invigorating to the heart, we ought by all means to avail ourselves of it. This agent is at our command, and it is water, which if properly employed constitutes the sheet anchor in the treatment of capillary bronchitis. We have already discussed the action of water, but in this particular affection the action of cold water on the sensory nerves of the skin induces such deep inspirations that air is compelled to pass through the narrowed lumina of the bronchioles. In the use of water the object to be attained is not necessarily a reduction of temperature, but a stimulation of the respiratory center. Not infrequently water slightly below the body temperature will effect such stimulation, although as a rule, water of a lower temperature (68° F. and under) will be necessary. In testing the value of hydrotherapy in this affection, the pulse and respirations (their frequency and depth), and not the temperature, should be our guide. We may employ the bath, packs or the siphon method. If the bath is employed, the child should be immersed in water at a temperature not less than 86° F. to begin with, and the duration of the bath should be about fifteen minutes. If necessary, warm water may be added and the duration of the bath prolonged. Rubbing the child with the water increases the efficiency of the bath. If the respirations become deeper and diminished in number, this temperature (86° F.) of the water may be maintained at this as well as in succeeding baths, but if such is not the case, the temperature may be increased or diminished, according to the action on the respirations. In such matters, individualization is necessary, always bearing in mind the fact, that warm is better than cold water, owing to the problematical danger of collapse symptoms. Many years elapsed and many lives were lost before the profession grasped the life-saving service of cold water in typhoid fever, and in the affections of the respiratory apparatus, the value of cold water must undergo a more tedious process of implantation insomuch as the ubiquitous bugaboo of "catching cold" is not easily subdued. Very often it may be necessary, while the child is in the bath, to execute the Juergensen method of diverting a stream of cold water to the nape of the neck, to cause deep inhalations. After removal from the bath, the child is dried and placed in bed. The bath may be given three times a day, or oftener, if necessary. The cold or warm packs are less efficient than the baths. The siphon method is serviceable, the technique of which is described under general treatment. What I have already said of poultices and friction with stimulating liniments applies as well with all cogency to this form of bronchitis.

The cough demands much consideration. The use of opium and its derivatives must be interdicted. The life of the individual depends on the power to expectorate, which is only effected by coughing. Sedatives anesthetize the bronchial mucosa and give a false impression of relief. If an expectorant must be employed apomorphin is by far the best. If the child is in danger from suffocation an emetic is indicated and often achieves ex-

cellent results. For this purpose apomorphin is the best remedy, given, if necessary, subcutaneously. Unfortunately we can not always depend on this remedy unless recently prepared; an old solution should never be employed, especially if it has turned green. When emetics are employed if even for their effects as expectorants, stimulants are always necessary. Such stimulation may be effected by brandy, digitalis, caffein, ether, ammonia or strychnia. Diet is important. The food should be liquid and concentrated, given frequently and in small quantities. Dyspeptic complications must be avoided as flatulent distension of the stomach and bowels only adds fuel to the respiratory embarrassment.

Nursing children cannot take the breast owing to the dyspnea. They should be fed with the spoon, and if they resist this method of nutrition, the milk may be poured down one nostril, closing the other in the meanwhile. The position of the child should be frequently changed to avoid the danger of lung collapse. The child or adult should be awakened frequently to prevent the accumulation of mucus in the bronchial tubes. The temperature of the sick-room and ventilation must be regarded. If the air in the room is too dry, it may be moistened by means of steam from a kettle, but this latter procedure is certain to interfere with ventilation, while its benefit is largely problematic.

Treatment of Chronic Bronchitis.—We have already discussed the sequelæ of this form of bronchitis, and have laid particular stress on the importance of sustaining the strength of the heart. This form of bronchitis is the *bete noir* of the physician. Here etiology plays the most important role. A tuberculous, gouty or syphilitic diathesis must be treated, and due regard must be paid to a weak heart or defective kidneys. The occupation of the individual must be regarded, and the duration of an out-of-door life taken into consideration, Weather changes exert an important influence in aggravating the bronchitis, and the over and underclothing demand the attention of the medical adviser. Thus far we note that the treatment is essentially prophylactic. The treatment of the disease itself consists in the use of drugs, climate, inhalations, tonics and the use of compressed air.

Drugs.—Cod-liver oil, if well borne by the stomach, is an excellent routine treatment. It must be taken for months, and its chief value is indicated by improvement in weight. The patient demands some relief for his cough. Here the physician is guided by three indications: 1. Reducing the viscidity of the sputum and facilitating its expectoration. 2. Checking the irritable cough. 3. The employment of drugs which modify the inflamed mucosa. The first indication is best fulfilled by using the mist. sodii et eth. chlor. of the Brompton Hospital Phar. It consists of:

Sod. bicarb....	gr. xv
Sod. chlorid.....	gr. v
Spirit. chlor	*m* v

M.

This is a single dose and may be taken three times a day in a wine glass of warm water. To this mixture, carb. of ammonia, iodide of potash (each gr. iii) and muriate of ammonia (gr. x) may be added to advantage.

The second indication requires the cautious use of sedatives, chief among which is codein. I prefer this remedy because it leads to no drug

habit, does not disturb the appetite and is not constipating. The more recent drugs, used for the same purpose, such as dionin and heroin, are in my experience, less reliable. An excellent sedative is the following:

Menthol	gr. x
Tinct. benzoin co	ʒi

This is introduced into a pint of boiling water and inhaled several times a day. Another mixture which I have used with good results for the same purpose is the following:

Menthol	20 gr.
Eucalyptol	20 min.
Chloroform	to make 4 fl. dr.

Inhale from 5 to 10 drops from the palm of the hand several times a day.

A spray of ipecacuanha wine may be employed.

The third indication is achieved by using drugs which are eliminated through the air passages and which diminish the secretion. Such drugs are the following: Terpin hydrate, tar, creosote, copaiba, benzoin, tolu, ammoniacum and myrtol. These remedies may be used by continuous inhalations by means of a respirator. Of late I have employed formaldehyd with signal sucess. The following solution may be used for inhalation by means of a nebulizer:

Formalin	1 drachm
Glycerin	4 drachms
Water	5 ounces

To obtain the effects of formalin vapor at night, this mixture may be sprayed in the room.

Climate.—This is the most important factor in treatment. The physician can only in a general way prescribe the climate which is most propitious, viz., a climate where the temperature is equable, where there is warmth, sunshine and absence of winds. There is something more in climate than its chemic constituents, something about which we know nothing. An asthmatic, like a bronchial patient, must seek his own climate, and this only, is the criterion of climate until our advanced knowledge will confer on the physician the ability to make his climatic prescriptions more definite.

Compressed Air.—Next to climate, this is the most powerful weapon which may be used against the disease. Our conception of chronic bronchitis is akin to that of an ill-drained wound. We must facilitate the drainage of the exudate. We must flood the bronchial sewers with fresh air currents, and unless the bronchial mucosa is beyond reparation, compressed air is almost a specific.

The treatment of bronchorrhea, as well as putrid bronchitis, is best attained according to my experience from the use of the creosote bath (*vide* General Treatment). In the treatment of fibrinous bronchitis, attempts have been made, but without success to dissolve the exudate by means of inhalations with remedies such as lime-water, lactic acid, papay-

otin, etc. Iodide of potash and mercurial inunctions have been highly extolled. It is often necessary to dislodge the fibrinous exudate by the aid of emetics, compressed air inhalations, etc. Creosote vapor baths may be employed for a like purpose, the violent paroxysms of coughing assisting in the mechanic expulsion of the casts.

[TO BE CONTINUED.]

Correspondence.

The White Rat Test of Vaccine Supposed to be Contaminated with Tetanus Virus in Camden, N. J., not Conclusive.

The recent experimentation in Camden, N. J., with vaccine virus, suspected of containing tetanus germs, by testing it on white rats which did not develop the disease, is not as fair a test as on its face it looks to be. In spite of the erroneous result, tetanus deaths continue to occur after vaccination of humans. Allow me to recapitulate somewhat on the subject of immunity. At the Congress of Berlin, a remarkable conference on the theory of infection, Prof. Bouchard touched the question of immunity, by showing that the organism disposes of a number of means of self-defense, the two most important being the destructive power of the leucocytes, which has been so well studied by Metschnikoff, and the bactericide state of the blood, a state which can exist normally in some animals and and which imparts to them natural immunity, or which can be produced by modifications of the liquids of their organisms, these modifications being determined by injections either of attenuated cultures, or of soluble products.

In the section of bacteriology of the Congress of London, this question of immunity was mooted again, and the names of the scholars who took their share in the discussion, Buchner, Emmerich, Roux, Metschnikoff, Hankin, Fodor, Babes, under the presidency of Lister, may give an idea of the interest of this sitting.

The two theories at issue were supported, on one side by Hankin, on the other by Metschnikoff assisted by Roux. Roux, the disciple of Pasteur, was given the floor. He said that all that had been done in this department, had for starting-point and common origin the attenuation of viruses, and the preventive inoculations, discovered by Pasteur's genius. Before him, if we except vaccine, the only manner of conferring immunity against a disease, consisted in inoculating the virus of the disease itself. To this dangerous and not easily manageable operation, Pasteur substituted preventive inoculations by means of attenuated viruses, the attenuation being obtained by two different processes; the prolonged exposition of the cultures to the air, at a suitable temperature, and the passage of the micro-organisms through the body of animals of different species.

At the beginning only living cultures were used, the weakened microbe being introduced into the organism. Later researches have shown that the immunity could be imparted by the introduction into the organism of the chemical products fabricated by the microbes themselves. From the chemical point of view, they belong to the large class of albuminoses.

Roux and Bouchard threw a flood of light upon the interesting point of the difference of action of these soluble products. The inoculations

made with these products, may either exercise a vaccinating influence, or, on the contrary, produce symptoms of intoxication. By what mechanism is this immunity obtained, and why does intoxication occur ? Roux tackled the theory of phagocytosis. He raised the question whether the immunity was the consequence of the property of the cells, which make them enwrap the cells, or whether it may not be that the immunity exists through that absorption of the virus by the cells. In a refractory organism, if the cells surround the microbes, is it not because the latter are in favorable condition, and remain inactive in the cells which have received them.

But facts bear out phagocytosis. Thus the bacteria introduced into the interior chamber of a rabbit's eye, where there are no cells, develop rapidly, and the development is checked only when the migratory leucocytes have invaded the cavity.

But what is the mysterious force that thrusts the cells against the microbes ? How is it that the leucocytes, which take possession of the bacillus in the vaccinated animal, must leave it alone in the non-refractory animal ? Metschnikoff explains this action, by an affinity of the leucocytes for the foreign bodies introduced into the tissues, and if the leucocytes are more active in vaccinated animals it is because they have passed through a regular training in consequence of the preventive inoculations of the attenuated virus ; by the contact of the microbe their affinity has been especially developed.

But the leucocytes some time get the worst of it. The microbes when attacked defend themselves by bringing forth substances which paralyze the salutary action of the leucocytes.

Mr. Metschnikoff defended his theory with much ardor. He took for type the septic vibrion in the guinea pig. In this disease, phagocytosis is the great agent of destruction, the bactericide virtue of the serum, remarkable as it is, cannot confer immunity against bacterian diseases. The theory of the microbicide powers of the humors of the body is absolutely insufficient, as has been found by one of the protagonists, Behring, in a large number of cases. Moreover, the action of the serum may be easily connected with phagocytic theory ; for the serum possesses the property of attracting the leucocytes, as has been demonstrated by Mesnard and Bordet, for the serum inoculated against the pyogenic disease in rabbits, and these facts have been confirmed by Roux and Behring for the serum of rats.

And now for Behring, of anti-diphtheritic serum fame. He is the founder of the theory of the microbicide blood, and admits that it cannot be applied easily to any other diseases, but tetanus and diphtheria, which are distinguished by their exceptionally toxic character, and the absence of diffusion of the microbes. As has been shown by Vaillard and Vincent, for tetanus, the animals affected with this disease are already naturally refractory to the microbe. In this immunity against the microbe, the principal part belongs to the phagocytes. If we assume, according to the idea of Mr. Ehrlich, that the crisis (occurrence of spasms in tetanus, for instance) in the infectious diseases is the result of a rapid formation of antitoxine, the part of the phagocytes remains still very important.

Intermittent fever and malaria are the best characterized types of the fever-diseases. Now we know that the specific spirillæ are precisely de

stroyed by the phagocytes during the crisis, and the period of apyrexia. In the monkey, where the spirillæ are totally destroyed by the cells, the disease terminates with the first attack, while in man, where the distruction is not complete, a second attack takes place in spite of the formation of antitoxine.

Metschnikoff gives always and everywhere the chief part to phagocytosis ; not so Hankin.

The bactericide virtue of the blood-serum, according to this last, leads to a new theory of immunity, which may be thus formulated :

Natural or acquired immunity is due to the presence of substances which are formed by the metabolism of the animals, and not by that of the microbes, and which have the power of destroying either the microbes, against which the immunity exists, or the products through which they exercise their pathogenous action.

This action is attributed to a proteid substance known by the name of "cell globuline." It destroys the bacilli of anthrax. Similar substances exist not only in animals, naturally refractory to anthrax, but also in those which are affected by the disease. These substances are called "defensive proteids," and it is in them that it is thought the bactericide virtue of the blood serum resides. Is the defensive proteid of a refractory animal more active, or does it exist in greater abundance in the non-refractory animal ? This demonstration was obtained by the study of the defensive proteid substances of the rat. Behring, in 1888, showed why this animal has a special power of resistance to anthrax ; that its serum is more alkaline than that of most other animals ; that it has moreover the power of killing the anthrax bacilli, a power which it loses when neutralized. Behring's conclusion was that the immunity presented by the rat is due to the strong alkalinity of its serum. There exists in that serum a proteid substance possessing an extremely well characterized alkaline reaction, and destructive of the bacillus anthracis. This substance when injected in mice, at the same time with sporules of anthrax, prevents the development of anthracic disease. On the other hand, the defensive proteids of the non-refractory animals do not possess this protective virtue. Thus Feser has shown that rats submitted to the vegetarian system are no longer refractory to anthrax. The common white rat remains refractory throughout, and the defensive proteids are always found in its spleen and serum, endowed with the same powers. With wild rats, however, the same results are obtained as Feser's.

Four rats were fed during six weeks with bread and meat, four others with nothing but bread. One rat of each group was inoculated with anthrax. The bread-fed rat alone died. The other rats were sacrificed, and it was found that the spleen and the blood-serum of the rats fed with meat contained defensive proteids in abundance, while only traces of the latter were found in those fed exclusively with bread.

In non-refractory young rats, there exists a proportion of defensive proteids smaller than in the adult animals. And strange to say, these rats resist inoculation when blood serum of their parents is injected in them. Do not these facts more than prove that the immunity of rats to anthrax, is due, in a great measure, to the presence in them, of these defensive proteids ?

Tizzoni and Cattani reached the conclusion that the "antitoxine" substance, existing in the serum of a dog made refractory to the tetanus, is a proteid substance mixed with ferments. Thus the immunity of rats to anthrax, and especially of the white rat, tested with the Camden, N. J., suspected vaccine virus, is due to natural alkalinity of defensive proteids in that animal's blood-serum.

Now the antitoxic substance of a refractory animal (to tetanus) is a proteid mixed with a ferment. How then can it be judged that those Camden white rats that were inoculated with an animal ferment, a diastasic hydrozyme of the calf, for instance, were not rendered immune to tetanus?

Other white rats should be inoculated with pure tetanic virus, with and without pure vaccine, to complete the test. For it is a well-known fact that the serum of several animals exercises a destructive action on a certain number of microbes. It has even been found that the serum of animals vaccinated against diphtheria and tetanus is capable of destroying the tetanic and the diphtheria poison. It has also been demonstrated that these remarkable properties of the serum vanish under the influence of divers physico-chemical actions (heat, light, etc.).

There is another property of the blood-serum demonstrated long ago; it is the power possessed by the blood-serum of one species of animal of destroying the red corpuscles of the blood of an animal of another species. This destructive influence may be called, for shortness sake, the globulicide power, as compared with the destructive power of the serum in the case of microbes, which we call microbicide power. For instance, the serum of dog's blood, after extracting the red corpuscles, if mixed with a guinea-pig's or rabbit's blood, will cause the red corpuscles to disappear as if dissolved. These globules are preserved indefinitely in the serum of an animal of the same species. If we mix with dog's serum some blood from the pigeon or frog, whose globules are provided with nuclei, we find these globules lose their coloring action, and in 25 to 30 minutes are reduced to their nuclei.

The serums of the ox, pigeon and turtle possess the same destructive power for red corpuscles of an animal of another species. The serum of rabbits has but a slight globucidal power for the corpuscles of mammals, birds and batracians. But the globucidal power of serum is infallibly destroyed, as well as bactericidal power, by heating it to 50–60° C. for 25 or 30 minutes. Serum exposed during eight or ten days to diffuse light loses its globucidal power.

Serum mixed, or even placed in the presence of essence of garlic, for several hours, loses entirely its globucidal power. The globucidal power of serum is interfered with with traces of corrosive sublimate, of sulphide of carbon, of paraldehyde, of vapors of mercury. A vacuum, however, as the glass tube of glycerinated vaccine, that was used in the Camden tetanus cases, does not modify it at all, nor ether, amylic alcohol, or methylic alcohol. Globucidal and non globucidal serum has the same alkalinity in the calf as in the white rat, and, therefore, are possible immunizing factors against tetanus.

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